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Indian Standard

कृषि अनुप्रयोगों के लिए क्षैतिज सेन्ट्रीफ्यूगल पम्पों के चयन, स्थापना, संचालन और रखरखाव — रीति संहिता

भाग 4 रखरखाव

(पहला पुनरीक्षण)

Selection, Installation, Operation and Maintenance of Horizontal Centrifugal Pumps for Agriculture Application — Code of Practice

Part 4 Maintenance

(First Revision)

ICS 23.100.10

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March 2023 **Price Group 5**

Pumps Sectional Committee, MED 20

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by Pump Sectional Committee had been approved by the Mechanical Engineering Division Council.

In order that pumpsets employed by farmers have longer operating life, it is necessary that the pumpsets are properly maintained. This part of the code has been formulated with the intention to provide sufficient guidelines to farmers for both maintenance of pumps and locating the causes of the trouble.

This Indian Standard was first published in 1980, and it specifies the broad guidelines for the maintenance of the pumpset.

This revision has been taken up to keep pace with the latest technological developments and practices followed in pumps industry. This revision incorporates the following major changes, apart from incorporating the amendments issued to the last version of the standard:

a) Under Table 1 more cause and remedies added for ‘pump is noisy’; and
b) A reference clause has been added mentioning the latest version of all the referred standards and editorial changes have been made.

The composition of the committee responsible for the formulation of this standard is listed in Annex A.

The code of practice for the selection, installation, operation and maintenance of horizontal centrifugal pumps for agriculture applicationis being brought out in four parts. This standard covers the broad guidelines for the maintenance of horizontal centrifugal pumps for agricultural applications. The other parts in this series are as follows:

Part 1 Selection
Part 2 Installation
Part 3 Operation

Indian Standard

SELECTION, INSTALLATION, OPERATION AND MAINTENANCE OF HORIZONTAL CENTRIFUGAL PUMPS FOR AGRICULTURE APPLICATION — CODE OF PRACTICE

PART 4 MAINTENANCE

(First Revision)

1 SCOPE

Lays down the general guidelines for the maintenance of horizontal centrifugal pumps for agricultural applications.

2 REFERENCE

The standard listed below contains provision which, through their references in the text, constitutes provision of this standard. At the time of publication, edition was valid. All standard are subject to revision and parties to agreement are subject to revision and parties to agreement based on this standard are encouraged to investigate possibility of applying the most recent edition of the standard listed below:

IS No.	*Title*
IS 10805 : 2022	Specification for foot — Valves, reflux valves or non — Return valves and bore valves to be used in suction lines of agricultural pumping systems (*first revision*)

3 MAINTENANCE

3.1 Successful and efficient operation of centrifugal pumps depends greatly upon proper selection and installation. To ensure most efficient operation and least maintenance, it is recommended that complete data should be submitted to the pump manufacturer so that he properly suggest a pump capable of fulfilling the requirements.

3.2 Daily Observation of Pump Operation

Daily observation regarding general performance of the pumps should be made and any irregularity in the operation of a pump should be taken care of properly. This refers particularly to changes in sound of a running pump, stuffing box leakage, power consumption and abnormal temperature rise in the pump.

3.3 Annual Inspection and Complete Overhaul

It is very difficult to make general rules about the frequency of complete overhaul as it depends on the pump service, the pump construction and materials and economic evaluation of overhaul cost versus the cost of power losses resulting from increased clearances, or due to other factors.

3.3.1 A pump need not be opened for inspection unless either factual or circumstantial evidence indicates that overhaul is necessary. Factual evidence implies that either the pump performance has fallen off significantly, or that noise and overloading of prime mover is in evidence. Circumstantial evidence refers to past experience with the pump in question.

3.4 Causes and Remedies for Faulty Operation

In operating a pump, apparently serious troubles may arise but close and careful inspection will normally reveal the fault to be due to some minor oversight; and investigation for irregular conditions of pump should be made.

3.4.1 A diagnostic analysis along with suggested remedies is given in Table 1.

Table 1 Causesand Remedies for Faulty Operation
(*Clause* 3.4.1)

Sl No. (1)	**Trouble** (2)	**Cause** (3)	**Remedies** (4)
i)	No water or less water being delivered	Pump may not be primed	Ensure proper priming by any suitable method.
		Speed may be too low	Check whether the prime mover is working satisfactorily or not. In case of electric motor it may be due to low voltage also. If prime mover is not directly connected, it may be due to belt slip, etc. if employed
		Discharge head too high	Check operating conditions. See that pipe friction and suction and discharge heads are as specified.
		Suction lift too high	Check it. Total suction lift should not exceed that recommended by the manufacturer.
		Impeller or piping may be choked	Inspect. Clear/repair/replace the pipe, suction strainer, check valve and impeller.
		Impeller may be rotating in wrong direction	Check and correct the direction of rotation of impeller.
		Air leaks may exist in suction line or stuffing box	Plug inlet and put line under pressure. A gauge in line will indicate leakage with a drop in pressure.
		Wearing rings may be worn	Check and replace, if required.
		Impeller may be damaged	Repair or replace.
		Foot valve may be too small	Inspect and replace it by another foot valve conforming to IS 10805.
		Casing gasket/stuffing box packing may be defective	Check, Replace worn out casing gasket/packing.
		Foot valve or suction opening may not be properly submerged	Suction entrance should be placed at least one metre below water level.
ii)	Pump works a while and then loses prime	May be a leakage in the suction line	Plug inlet and put line under pressure. A gauge in line will indicate leakage with a drop in pressure. Check for air leakage and repair the pipe line.
		Water seal may be choked	Inspect line and position of seal cage in stuffing box.
		Suction lift too high for operating point	Check for obstruction in suction line and for low water level.
		Presence of air in the water	Vent suction back to source of supply.

Table 1 (*Continued*)

Sl No. (1)	**Trouble** (2)	**Cause** (3)	**Remedies** (4)
		Foot valve or suction opening may not be properly submerged	Suction entrance shall be place at least one meter below water level.
iii)	Pump consumes excessive power	Speed too high	Suitably reduce the speed of prime mover or replace the existing pulley of the prime mover or counter shaft, by another pulley of the appropriate diameter.
		Head is lower than the rated value and the volume rate of flow of pump increases	Let pump manufacturer calculate impeller diameter required, and then turn impeller outside diameter.
		Mechanical defects such as a bent shaft	Check runout of the shaft. Total runout allowed depends upon pump design and speed; approximately 0.08 mm for high speed and 0.15 mm for low speed units. If bent more than allowed, replace it.
		Rotating elements may be binding	Check for too tight stuffing boxes wearing ring fit and defective packing.
		Foreign matter in impeller	Provide means for removal of foreign matter.
		Misalignment	Re-align properly.
		Pump is inefficient	Replace the pump
		Improperselection of pump	Select proper size of the pump depending upon the requirements
iv)	Bearings have short life	Misalignment	Re-align properly.
		Shaft excessively bent	Replace.
		Rotor out of balance causing excessive vibration	Balance the rotor.
		Excessive thrust caused by a mechanical failure inside the pump	Suitably repair it.
		Lack of lubrication	Ensure proper lubrication.
		Dirt in bearings	Clean and lubricate.
		Excessive grease or oil in antifriction bearing housing or lack of cooling causing excessive bearing temperature	Remove excessive grease or oil and improve cooling, if require.
		Excessive cooling of water cooled bearing housing resulting in	Decrease the flow rate of cooling water to prevent over cooling.

Table 1 (*Concluded*)

Sl No. (1)	**Trouble** (2)	**Cause** (3)	**Remedies** (4)
		condensation of moisture from the atmosphere in the bearing housing	
v)	Pump overheated and seizes	Pump not primed	Ensure proper priming.
		Rotating part rubbing on stationary part	Prevent it by suitable adjustment.
		Bearings worn	Replace worn out bearings.
		Rotor out of balance causing vibration	Properly balance the rotor.
vi)	Pump is noisy	Air leaks in suction	Replace or tighten joints and fittings.
		Insufficient water supply	Ensure proper supply of water.
		Bent drive shaft	Replace.
		Misalignment or impeller not properly balanced	Realign or balance the impeller properly.
		Vibrations due to non-rigidity of the foundation or nuts of foundation bolts loose	Tighten nuts and take corrective action.
vii)	Pump wears rapidly	Pump runs dry	Take every precaution to prevent dry running of the pump.
		Grit or dirt in water	Provide means to clear off dirt and grit from the water being handled.
		Pipe strain on pump casing	Provide proper support to pipe especially at suction and discharge ends.
		Worn–out bearings	Check and replace the bearings

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Pump Sectional Committee, MED 20

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